B.H. Smith
CTJ

RESTORATION OF RIPARIAN HABITATS WITHIN THE BLM-ROCK SPRINGS DISTRICT

BY: BRUCE H. SMITH
DISTRICT FISHERIES BIOLOGIST
BUREAU OF LAND MANAGEMENT
P.O.BOX 1869
ROCK SPRINGS, WYOMING 82901

PRESENTED TO: NATIVE PLANTS INC.

WILDLIFE HABITAT REHABILITATION AND RECLAMATION SYMPOSIUM

JANUARY 10-11, 1983
TRI-ARC CONVENTION CENTER
SALT LAKE CITY, UTAH

ABSTRACT

This presentation summarizes riparian rehabilitation programs currently being conducted by the Salt Wells, Big Sandy, Kemmerer, and Pinedale Resource Areas, within the Bureau of Land Management's Rock Springs District. Initially focusing on stream habitat improvement to enhance the immediate survival prospects of sensitive status Bear River and Colorado River cutthroat trout, the basic principles of these programs are now being utilized with broader multiple use applications. Present riparian habitat improvement efforts are testing the utilization of both special beaver and livestock grazing management relationships in restoring deteriorated or lost riparian communities.

ACKNOWLEDGEMENTS

The various program activities highlighted in this report are a result of the combined efforts of our four resource area managers and their respective resource management staffs, along with ongoing cooperative fieldwork and program support from the Wyoming Game and Fish Department, the Smith's Fork Grazing Association, the Currant Creek Ranch and the White Acorn Ranch. Special appreciation is also due the Divisions of Administration and Support Operations for their long term support and assistance in these programs.

(Note: This is a slide presentation and may be obtained on a loan basis from the Rock Springs District Manager, Bureau of Land Management, P.O. Box 1869, Rock Springs, Wyoming 82901).

(P-1) Riparian zones on public lands in the arid west typically represent less than 1% of the total land surface area. These zones are most readily defined by their associated hydrophytic plant communities, which are a critical resource base for the maintenance of watershed stability, water quality, wildlife habitat, livestock grazing and recreation uses. (P-2) Recent studies have found that, of the various riparian plant communities, the willow/grass community produces the greatest amount of total vegetative biomass. (P-3) Unfortunately however, many livestock grazing programs to date have not managed for the maintenance or improvement of this community. (P-4) In fact, declining trends in riparian communities (keyed to willows) were documented over thirty years ago! (P-5) The loss of a complete willow age class structure, (P-6) followed by the subsequent loss of even the older parent plants, are indicators of declining community structure (P-7) often resulting in accelerated streambank erosion and a lowered riparian water table. This trend has led to the loss of as much as 83% of former riparian communities and their associated carrying capacity, in southwestern Wyoming. (P-8) Initially, fisheries habitat improvement efforts in the BLM's Rock Springs District were undertaken with a "key species" orientation, in support of recovery efforts for the sensitive Bear River and Colorado River cutthroat trout. (P-9) These pilot projects found that, with two seasons' rest from livestock grazing, a significant improvement of instream habitat, bank stabilization and meadow production (44%) had occurred. However, in areas such as this, where native willow communities had been eliminated, despite even six years of rest and numerous replanting attempts, we have stil been unable to achieve a recovery in willow populations!

(P-10) In the interim, cooperative instream habitat improvement work is being conducted in order to achieve a more rapid habitat response for these rare fish. (P-11) In recent years, our programs have expanded to include a variety of riparian community objectives. To date, approximately 50 riparian improvement, study, or special management projects are underway within our four resource areas. (P-12) Insofar that livestock grazing is not only a significant use, but also a major factor, influencing the condition of riparian habitats, these projects incorporate various riparian grazing study or management objectives as well. (P-13) In certain cases, special riparian livestock grazing mini-pastures have even been constructed, in order to determine riparian recovery potentials in response to trial grazing systems, operated independently from the overall allotment. Hopefully, these test systems will enable us to develop site specific and effective management treatments for restoration of lost riparian carrying capacities, in anticipation of scheduled Environmental Statements.

(P-14) In cooperation with some of our grazing permitees, we have been able to implement full scale special grazing management systems. As an example, the White Acorn Management System incorporates alternating seasonal use and rest, with a full years' rest. (P-15) Designated with improved riparian habitat objectives in mind, it appears this system is already producing a visible response, with improved riparian meadow habitat and willow regeneration, after the first three year cycle!

(P-16) In many areas within our district, the problems of riparian recovery are much more complex, due to drainage problems which are more massive and physical in nature. (P-17) In these areas, most of the riparian communities which were present at the turn of the century no longer exist. (P-18) However, a few surviving type areas (such as on the Currant Creek Ranch), remnant willows, or

willow based riparian systems, (P-19) provide watershed stability and a high degree of rangeland productivity as it had once existed. (P-20) These historic riparian communities provide a stark contrast to general stream conditions, found just outside of the ranch! Typically, depending on the nature and severity of a drainage problem, "second wave" (P-21) technological solutions would be applied; solutions with costs ranging from (P-22) $3,000 to $100,000 per site. Over the past several years however, we have been working towards the development of "third wave" synecological techniques, (P-23) in cooperation with nature's engineer, the beaver, and the Wyoming Game and Fish Department. This program has evolved as a byproduct of our district-wide stream habitat inventory, during the course of which, over 1,500 beaver ponds were surveyed.

One significant finding of our survey was the fact that, contrary to much of the existing literature pertaining to beaver ecology, beaver in our district were apparently not following the manual! For instance, (P-24) beaver are not supposed to build dams in steep (20% slope) drainages. However, someone apparently forgot to tell this colony, for, with the availability of heavy duty building materials (in the form of aspen), they went ahead and did it anyway! (P-25) Also, it is theoreticaly impossible for beaver to survive without sufficient supplies of willow, aspen, alder and the like. Despite this "fact", these beaver are making the best of a bad situation, using anything available, in order to construct their escape and winter food storage habitat. We should probably mention at this point, the fact that beaver were old drinking buddies with the hairy mammoth. Now, it is quite obvious to most people, that the mammoth has long since passed from the scene on our western rangelands. (P-26) However, the beaver is still here! Ladies and gentlemen, this should tell us something about this animal's capacity for adaptation! (Even to the point where they are using sagebrush for their dams, as noted here.)

(P-27) In light of this information, we therefore felt that, given the adaptable, hard working, persistent nature of this animal, it might be possible to achieve stream or riparian habitat improvement at very little cost, simply by providing a limiting factor: i.e., structurally sound building materials. (P-28) By supplying these materials (aspen logs) to beaver already attempting construction of small, unstable dams (due to a lack of building materials), (P-29) they were able to subsequently build larger, more substantial dams, leading to the development of a more fully structured habitat site. (P-30) Besides providing a 300 foot long, Class 1 pool for overwinter survival habitat of the Bear River cutthroat trout, this re-elevated water table is leading to the re-establishment of productive riparian soil community conditions and systematic functions, which will accelerate the recovery of this riparian meadow community as well.

We then tried to expand this basic concept in two ways. First, (P-31) by taking it from a sub-montane/foothills riparian site, to the adverse and physically overriding conditions of a cold desert gully cut stream system south of Rock Springs. (P-32) Secondly, to actively live trap beaver by conventional means, (as well as by unconventional means, utilizing coyote (P-33) snares which, due to their low cost, provide us with greater efficiency (P-34) for time spent in the field.) (P-35) and then placing these beaver at specific project sites, where riparian recovery was desired. In the case of our Salt Wells Resource Area's Currant Creek project, we were faced with very little remnant wilow rootstock and annual rest was required. (P-36) This was achieved through the

use of a 5,000 volt electric fence system. Within the first year, initial streambank and floodplain stabilization was well underway, as a function of the rest treatment. (P-37) With the added influence of water table elevation, via the structural supplementation concept, (P-38) willow regrowth and sprouting was abundant, to an average heighth of 2.5 feet in the first year! By the end of the second year of rest, (P-39) full riparian recovery was underway in those areas with elevated water tables and beaver activity. Runoff events in these sites are being laterally dissipated for a level spill, as opposed to a normal exponential concentration of flow energies, in the original box shaped, gully cut channel. (P-40) This lateral dissipation accelerates sediment deposition throughout the establishing marsh and wet meadow system, thereby cycling associated nutrients into a terrestrially based primary production, (P-41) instead of supporting extensive algae blooms and eutrophication of the Flaming Gorge Reservoir, further downstream.

(P-42) Two major problems which have continued to plague our efforts have been:

1. Contrary to opinions held earlier in the century, in this case an excerpt from a Roosevelt Bulletin of the 1920's, today there are often intense adverse opinions held towards beaver, due to the nuisances they sometimes create in areas of human conflict.

2. The misconception that we are simply "feeding" these animals.

(P-43) In an effort to dispel some of these opinions, we have applied the basic principles of our concepts in an entirely different context, within one of the most adverse gully cut drainages in our district. (P-44) By once again providing a structurally stabilizing element, this time truck tires, to small, blowout prone, beaver dams, beaver (P-45) have been able to significantly increase the size of their dams. (P-46) These dams have subsequently withstood the usual washout effects of spring runoff, (P-47) and have collected up to ten times more sediment than a normal small dam, (P-48) thereby effecting a major change in the structural configuration of this gully, along with the time and space relationships of riparian components of the system. (Note the small typical dams, washed out, in the lower foreground.) (P-49) The site stability thus provided, sets the stage for riparian recovery by native vegetation and hopefully, subsequent gully stabilization. (P-50) At the present time, after two years of operation, this site appears to be stabilizing as a result of the numerous hydrologic nick points created by beaver, and the extensive amount of riparian vegetation subsequently becoming established in the gully bottom.

Willow recovery in this unfenced site has also been good and it appears that the site is close to a point where this system is now operating on a self sustaining basis. It should be noted that these results are being achieved through assistance from the owners of the Currant Creek Ranch. (P-51) Through their cooperative efforts to improve cattle distribution, thereby reducing livestock concentrations in this stream bottom, (P-52) not only is a grass and forb improvement underway, (P-53) but a fully structured riparian community recovery is occurring as well.

Annual or seasonal rest, keyed to the growth requirements of willows, has been a primary factor in achieving these results. We are, however, working on some other ideas to reduce the rest, or accelerate the response, in riparian recovery programs. (P54) These include lateral pruning of saplings to accelerate

vertical growth, supplemental fertilization with sulfur coated urea to enhance the functions of sulfate and nitrate reducing bacteria, and utilization of a "northern states energy mix" of hybrid poplars. (P-55) In the latter case, our study plantings this year had a 90% survival rate; the best of any planting to date. While our field plantings were quite heavily browsed, (P-56) it is interesting to note that without the effects of browsing, this eighteen inch rooted cutting grew to six feet in only one season, under controlled conditions! With a reported growth rate of one inch DBH per year, these trees may enable us to develop beaver supporting riparian habitat with a cycling frequency of as little as ten years. (As opposed to natural timeframes of 30 to 100 years.)

(P-57) In summary, I feel that in order to effectively improve or reconstruct riparian ecosystems, it is essential that we first develop a holistic appreciation for the vast and complex assemblage of both physical and biological forces at work within these systems. Only then, can we take a close hard look at individual elements of a system, identify limiting factors, and design appropriate management strategies for solution of our riparian problems. To me, the effective application of scientific principles in natural resource management is really an art. We must therefore strive to become artists in our field. For, in the words of Marsh McLuhan, "The artist is the man in any field, scientific or humanistic, who grasps the implications of his actions and of new knowledge in his own time. He is a man of integral awareness."

(POSTSCRIPT)

The attached listing of selected references is provided in reference to many aspects referred to within this report. These references will hopefully provide the reader with a broader perspective and more in-depth understanding of the many principles associated with riparian system recovery relationships.

SELECTED REFERENCES

Apple, L. 1982. Currant Creek and Sage Creek Beaver Habitat Study Area 1981 Progress Report. Salt Wells Resource Area, Bureau of Land Management, Rock Springs District, Wyoming.

_____1983. Currant Creek and Sage Creek Beaver Habitat Study Area 1982 Progress Report. Salt Wells Resource Area, Bureau of Land Management, Rock Springs District, Wyoming.

Armour, C.A. N.D. Effects of deteriorated Range Streams on Trout, Bureau of Land Management, Idaho State Office.

Bartos, D.L. and Johnston, R.S. 1978. Biomass and Nutrient Content of Quaking Aspen at Two Sites in the Western United States. Forest Science, Vol. 24, No. 2, June, 1978.

Boto, K.G. and Patrick, W.H. 1978. Role of Wetlands in the Removal of Suspended Sediments. Wetland Functions and Values: The State of Our Understanding, American Water Resources Association, 11/78.

Branson, F.A., Gifford, G.F., and Owen, J.R. 1972. Rangeland Hydrology. Society for Range Management, Range Science Series, No. 1, 10/72.

DeByle, N.V. 1978. Our Western Aspen Ecosystem-Quest for Management Western Wildlands Winter 1978.

Hansen, D.J. 1977. Interrelationships of Valley Vegetation, Stream Regimen, Soils and Solar Irradiation Along the Rock Creek in the Uinta Mountains of Utah. PhD Dissertation, University of Michigan.

Heede, B.H. 1978. Research: Designing Gully Control Systems for Eroding Watersheds. Environmental Management Vol. 2, No. 6 pp. 509-522.

_____1977. Case study of a Watershed Rehabilitation Project: Alkali Creek, Colorado. USDA Forest Service Research Paper RM-189.

_____1980. Stream Dynamics: An Overview for Land Managers USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-72.

Johnson, K.L. 1978. Managing Livestock Grazing in Relation to Runoff and Erosion. Rangeman's Journal 5(5), October.

Kadlec, R.H. and Kadlec, J.A. 1978. Wetlands and Water Quality. In: Wetland Functions and Values: The State of Our Understanding American Water Resources Association, November.

Logan, L.D. 1979. Native Vegetation for Streambank Erosion Control Presented at 31st Annual Meeting, Forestry Committee, Great Plains Agricultural Council, CSU, Ft. Collins, Colorado, June 18-21.

Miller, R.E., Lavender, D.P., and Grier, C.C. 1976. Nutrient Cycling in the Douglas Fir Type - Silvicultural Implications From: Proceedings, 1975 Annual Convention, Society of American Foresters, p. 359-390.

Miller, R.C., Skinner, Q.D., and Hasfurther. 1979. Soil Moisture Relationships in a Western Alluvial Valley Floor, Symposium on Surface Mining Hydrology, Sedimentology and Reclamation, University of Kentucky, Lexington, KY December 4-7, 1979.

Orr, H.K. 1975. Recovery From Soil Compaction on Bluegrass Range in the Black Hills. From: Transactions, American Society of Agricultural Engineers, Vol. 18, No. 6, p. 1076-1081.

Sandoz, M. 1964. The Beaver Men, Spearheads of Empire. University of Nebraska Press, Lincoln, Neb.

Schier, G.A. 1978. Vegetative Propogation of Rocky Mountain Aspen USDA Forest Service, General Technical Report INT-44, August, 1978.

Shute, D.A. N.D. Decline of Riparian Communities in a Portion of Southwestern Wyoming.

Smith, B.H. 1980. Riparian Willow Management: Its Problems and Potentials Within the Scope of Multiple Use on Public Lands. In: Proceedings, University of Wyoming Shrub Ecology Workshop, Lander, Wyoming. June 5-6, 1980. Herb Fissor, Ed.

_____Not all Beaver Are Bad; Or, An Ecosystem Approach to Stream Habitat Management, With Possible Software Applications. In: Proceedings, 15th Annual Meeting, American Fisheries Society, Colorado-Wyoming Chapter, Feb. 27-28, 1980., Ft. Collins, Colo. Roy Whaley, Ed.

Thomas, J.W., Maser, C., and Rodiek, J.E. 1979. Riparian Zones - Wildlife Habitats in Managed Rangelands of Southeastern Oregon USDA Forest Service General Technical Report PNW - 80

Toffler, A. 1980. The Third Wave. William Morrow and Co., Inc., New York

Trappe, J.M. and Fogel, R.D. 1977. Ecosystematic Functions of Mycorrhizae. From: The Belowground Ecosystem: A Synethesis of Plant Associated Processes, p. 205-214, Range Sci. Dep. Sci. Ser. No. 26, Colorado State University, Ft. Collins, Colorado.

Trappe, J.M. 1981. Mycorrhizae and Productivity of Arid and Semiarid Rangelands. In: Advances in food producing systems for arid and semiarid lands, p. 581-599. Acad. Press Inc., New York.

Tuinstra, K.E. 1967. Vegetation of the Floodplains and First Terraces of Rock Creek Near Red Lodge, Montana. PhD Dissertation. Montana State University, Bozeman, Mont.

White, R.J. and Brynildson, O.M. 1967. Guidelines for Management of Trout Stream Habitat in Wisconsin Technical Bulletin No. 39, Wisconsin Dept. of Natural Resources, Madison, Wisc. (Esp. note Appendix A in reference to Physical Processes in Streams, from Leopold and Wolman, Leopold and Langbein, and Leliavsky)

Winegar, H.H. 1977. Camp Creek Channel Fencing - Plant, Wildlife, Soil and Water Response. Rangemen's Journal, Vol. 4, No. 1, Feb. 1977 p. 10-12.